

## REMARKS

Reconsideration of this application is respectfully requested.

Upon entry of the foregoing amendments, claims 1-6, 8-17 and 20-24, 28 and 30-32 are pending in the present application, with claims 1 and 16 being the independent claims. Claims 7-10, 18, 19, 25-27, and 29 have been canceled without prejudice or disclaimer. Based on the above amendments and following remarks, Applicant respectfully requests that all outstanding rejections be withdrawn.

The Office Action on pages 2-6, in sections 2-3, rejects claims 1, 16-20, and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al.

As per claim 1, the Office Action asserts that Handelman ('522) teaches the recited features except the recited plurality of routes and router element. To cure this deficiency, referring to Figures 2 and 3 of Chang, the Office Action relies on Chang as teaching an optical transmission network having a plurality of routes for transmitting optical signals, and a wavelength component-specific route setting device to set routes for each of the wavelength component for transmission on said WDM transmission network. The Office Action further asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to use the distribution device in a WDM network of multiple paths since first, the networks by definition typically reach multiple destinations and thereby require multiple paths. and second, the network in Chang is capable of accommodating data traffic of multiple protocols and formats by separating traffic according to throughput and latency requirements. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Exemplary embodiments of the present invention provide a system of transmitting a transmission signal to a plurality of wavelength channels. Such embodiments include a one channel to many channel system. Claim 1 recites an optical transmission device to...send each of said WMD signals to a specific route of the plurality of routes of said WMD transmission network. Handelman ('522) does not teach or suggest the recited optical transmission device. Instead, Handelman ('522) teaches a function for providing the transmission side with

to said acquired information, together with said distribution instruction,

wherein said transmission efficiency optimization means comprises:

a band-transmission efficiency evaluation unit which applies, to said optical transmission device, WDM transmission network and optical receiving device, instructions to evaluate band capacity usage and transmission efficiency for all wavelengths during transmission of said distributed transmission signals, and which obtains transmission quality information from evaluation signals captured from said optical receiving device; and

a signal distribution determination unit which re-determines the details of distribution of said WDM signals, based on said transmission quality information, and

wherein said transmission efficiency optimization means comprises:

route transmission quality adjustment means which makes a pass/fail judgment on transmission quality, based on said transmission quality information, and which controls the transmission speed of the WDM signal output unit of said optical channel unit, based on the judgment result.

25-27. (canceled).

28. (currently amended) A wavelength division multiplex transmission system according to claim 26, in which said transmission quality information comprises defect information which indicates that a defect has occurred in said optical channel unit or said optical receiving unit, and in which said transmission quality information comprises defect information which indicates that a defect has occurred in a network element within said WDM transmission network.

29. (canceled)

30. (original) A wavelength division multiplex transmission system according to claim 17, in which said optical transmission device comprises an auxiliary optical channel unit of fixed wavelength or of variable wavelength, in parallel with said optical channel unit, and which is used when a defect occurs in said optical channel unit.

22. (original) A wavelength division multiplex transmission system according to claim 16, in which said optical receiving device comprises:

an optical receiving unit which, when said WDM signals are input from said WDM transmission network, converts said WDM signals into electrical signals at each wavelength and outputs the electrical signals; and

a delay compensation unit which compensates for delays, differing by route, of electrical signals at each wavelength.

23. (original) A wavelength division multiplex transmission system according to claim 18, in which said optical receiving device comprises:

an optical receiving unit which, when said WDM signals and said evaluation signals are input from said WDM transmission network, converts said WDM signals and evaluation signals into respective electrical signals at each wavelength, identifies these electrical signals obtained by conversion as WDM signals or evaluation signals, and outputs said WDM signals and evaluation signals; and,

a delay compensation unit which compensates for delays, differing by route, of electrical signals at each wavelength.

24. (currently amended) A wavelength division multiplex transmission system according to claim 20, in which said network management device instructs said optical transmission device, WDM transmission network and optical receiving device to acquire empty route information for each wavelength and transmission quality information for empty routes, in response to a communication initiation notification from said optical transmission device, and which comprises optimal route selection means to determine the optimal route from these information, and transmission efficiency optimization means to determine the content of instructions for distribution of said WDM signals based on these information,

wherein said transmission efficiency optimization means is designed to send, to said optical transmission device, WDM transmission network and optical receiving device, instructions to switch said WDM signal distributed transmission to said optimal routes according

information indicating that a threshold level has fallen when the quality of at least one of N channels falls below a threshold. See, Handelman ('522), col. 3, lines 45-50. This function does not teach or suggest an optical transmission to send each of said WMD signals to a specific route of the plurality of routes of said WMD transmission network.

Chang does not cure this deficiency. Instead, Chang teaches an optical wavelength route switching system having a plurality of routes for transmitting an optical signal and a plurality of arrival points. See, Chang, Figure 2. Such a system does not send each of said WMD signals to a specific route of the plurality of routes of said WMD transmission network. For at least this reason, the Office Action fails to establish a *prima facie* case of obviousness.

Furthermore, claim 1 recites an optical receiving device to restore the WDM signals from the WDM transmission network into the transmission signals, and a wavelength component-specific route setting device to set routes for each of the wavelength components for transmission on said WDM transmission network. Neither Handelman ('522) nor Chang teach or suggest these recited features. Therefore, the Office Action fails to establish a *prima facie* case of obviousness. Hence, claim 1 is allowable over the relied upon combination of Handelman ('522) and Chang.

Claim 16 recites, in pertinent part, that:

said optical transmission device and optical receiving device are designed to cooperate in generating transmission quality information for a plurality of routes within said WDM transmission network, with said transmission quality information provided to said network management device from said optical receiving device;

said network management device is designed to apply to said optical transmission device distribution instructions for distribution of each wavelength, to appropriate routes of the plurality of routes, of said WDM signals; and,

said optical transmission device is designed to distribute said transmission signals, in order to set routes by wavelength for said WDM signals according to distribution instructions, and output distributed transmission signals.

Hence, the WDM network management device is a system for providing instructions to the optical transmission device to distribute wavelengths, routes, and wavelength signals. In such a system, each transmission device and reception device sets the wavelengths, routes, and so on appropriately in accordance with these instructions.

Handelman ('522) does not teach or suggest the recited optical transmission device or network management device. As described above, Handelman ('522) teaches a system for providing notification of a channel, from among  $k$  channels, that has exceeded a threshold. See, Handelman ('522), col. 3, lines 45-50. More specifically, Handelman ('522) teaches a system for providing notification of a channel that has exceeded an evaluation reference value serving as a threshold. Such a system does not teach or suggest the recited generating transmission quality information for a plurality of routes within said WDM transmission network.

Change does not cure this deficiency. Instead, Chang teaches a system for wavelength control in an IP layer. Such a system is for performing wavelength routing according to the overhead when a frame of an IP packet includes an overhead and a payload, and does not teach or suggest generating transmission quality information for a plurality of routes within said WDM transmission network. For at least this reason, the Office Action fails to establish a *prima facie* case of obviousness, and claim 16 is allowable over the cited combination of Handelman ('522) and Chang.

Claim 17 has been amended to include the recited features of claims 18 and 19. Hence, this rejection is moot with respect to claims 18 and 19. As per claim 17, claim 17 depends from claim 16 and is allowable for at least the reason that claim 17 depends from an allowable claim. Further, the cited combination of Handelman ('522) and Chang does not teach or suggest the recited features of claim 17. Handelman ('522) teaches monitoring data signals, but not teach or suggest generating evaluation signals. See, Handelman ('522), Figure 2, element 305. Chang teaches sharing a signal distribution function, but does not teach or suggest the recited evaluation signal. Accordingly, claim 17 is allowable over the cited combination of Handelman ('522) and Chang.

Claim 20 depends from claim 17 and is allowable for at least the reason that claim 20 depends from an allowable claim. Further, claim 20 recites a WDM signal output unit which outputs WDM signals corresponding to distributed transmission signals in accordance with said distributed transmission signals. Neither Handelman ('522) nor Chang teach or suggest the recited WDM signal output unit. At best, Handelman ('522) teaches that if a channel of the  $k$  WDM transmission wavelengths falls below the quality threshold, notification thereof is provided, and channel hopping is performed. The mere teaching of channel hopping does not

teach or suggest a WDM signal output unit which outputs WDM signals corresponding to distributed transmission signals in accordance with said distributed transmission signals. Hence claim 20 is allowable over the cited combination of Handelman ('522) and Chang.

Amended claim 24 depends from claim 20, and is allowable for at least the reason that claim 24 depends from an allowable claim. Further, amended claim 24 recites is that the transmission speed of the optical signal of a WDM signal is controlled according to the results of determinations regarding the transmission quality. In other words, exemplary embodiments of the present invention comprise route transmission quality adjustment means for controlling the transmission speed from determination results based on information such as the lack of minimum light reception, the noise characteristic, and the wavelength dispersion characteristic to a level (transmission frequency) that is not affected by these characteristics. Neither Handelman ('522) nor Chang teach or suggest these recited features. Accordingly, claim 24 is allowable over the cited combination of Handelman ('522) and Chang.

In view of the above, Applicants respectfully request that this rejection be withdrawn

The Office Action on pages 6-9, in section 4, rejects claims 2, 4-10, and 21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al and in further view of U.S. Patent No. 6,466,985 to Goyal et al. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Applicants initially note that claims 7-10 have been canceled, thus rendering this rejection moot with respect to claims 7-10.

Claims 2, 4, 5, and 6 depend from claim 1. As discussed above, the combination of Handelman ('522) and Chang does not teach or suggest the recited features of claim 1. Further, Goyal fails to cure the deficiencies of the combination of Handelman ('522) and Chang. Instead, Goyal teaches that a (management) label is attached to a packet signal. See, e.g., Goyal, col. 2, lines 15-27. In contrast, while in Goyal, a label is applied, in claims of the present invention, information specifying a route is applied. Hence, claims 2, 4, 5, and 6 are allowable over the cited three-way combination of Handelman ('522), Chang, and Goyal.

Claim 21 depends indirectly from claim 16. As discussed above, the combination of Handelman ('522) and Chang does not teach or suggest the recited features of claim 16. Further, Goyal fails to cure the deficiencies of the combination of Handelman ('522) and Chang as discussed above. Specifically, claim 21 recites that said optical channel unit is designed such that labeling information for sending on respective corresponding routes of WDM signals and evaluation signals is added to said WDM signals and said evaluation signals according to said distribution instructions, and said signals are output. Although Goyal teaches a QoS configuration method using IP, it does not teach or suggest adding labeling information and evaluation signals to WMD signals. Accordingly, claim 21 is allowable over the cited three-way combination of Handelman ('522), Chang, and Goyal.

In view of the above, Applicants respectfully request that this rejection be withdrawn.

The Office Action on pages 9-11, in section 5, rejects claims 3, 22, and 23 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al and in further view of U.S. Patent No. 6,574,018 to Handelman. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Claim 3 depends from claim 1. As discussed above, the combination of Handelman ('522) and Chang does not teach or suggest the recited features of claim 16. Further, Handelman ('018) does not cure these deficiencies. Claim 3 recites a delay compensation unit which absorbs differences in the propagation delay of distributed transmission signals from each of said optical receiving units. In contrast Handelman ('018) an electronic signal delay is applied as a buffer for a constitutional element of an optical switching system. Such an electronic delay signal does not teach or suggest the recited delay compensation unit. Accordingly claim 3 is allowable over the cited three-way combination of Handelman ('522), Chang, Handelman ('018).

Claims 22 and 23 depend variously from claim 16. As discussed above, the combination of Handelman ('522) and Chang does not teach or suggest the recited features of claim 16. Further, Handelman ('018) does not cure these deficiencies. Claims 22 and 23 recite a delay compensation unit which compensates for delays, differing by route, of electrical signals at each wavelength. In an exemplary embodiment of the invention, the delay compensation denotes a

delay function which is capable of compensating for delays among signals straddling a plurality of wavelengths on different fiber routes. Such an exemplary delay function is intended to compensate for differences in the propagation delay of signals passing along different physical routes.

The cited three-way combination does not teach the recited delay compensation. Instead, the combination at best teaches a switching time adjustment function serving as a constitutional element of the optical switch system. The delay element can be understood as a delay function aimed at adjusting the delay between a non-wavelength-converted optical signal and a wavelength-converted signal. This is believed to compensate for the time difference required for OE conversion and EO conversion. However, this system does not teach or suggest, a delay compensation unit which compensates for delays, differing by route, of electrical signals at each wavelength. Accordingly, claims 22 and 23 are allowable over the cited three-way combination of Handelman ('522), Chang, Handelman ('018).

In view of the above, Applicants respectfully request that this rejection be withdrawn.

The Office Action on pages 11-12, in section 6, rejects claims 11-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al, in further view of U.S. Patent No. 6,466,985 to Goyal et al., and in further view of U.S. Patent No. 5,949,563 to Takada. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Claims 11-14 depend variously from claim 1. As discussed above, the combination of Handelman ('522), Chang and Goyal does not teach or suggest the recited features of claim 1. Takada does not cure these deficiencies. Instead, Takada teaches a standby auxiliary optical wavelength system having a wavelength conversion function. Such a system does not teach or suggest the wavelength division multiplex transmission system recited in claims 11-14. Accordingly, for at least this reason, claims 11-14 are allowable over the four-way combination of Handelman ('552), Chang, Goyal, and Takada.

Further, claim 11 recites "empty band capacity for each wavelength component." Takada does not teach or suggest this feature. Accordingly claim 11 is allowable over the four-way combination of Handelman ('552), Chang, Goyal, and Takada for at least a second reason.

Claim 12 recites "an auxiliary optical channel unit." Takada does not teach or suggest this feature. Accordingly claim 12 is allowable over the four-way combination of Handelman ('552), Chang, Goyal, and Takada for at least a second reason.

Claim 13 recites a fixed wavelength component for auxiliary use. Takada does not teach or suggest this feature. Instead, Takada teaches means for realizing an auxiliary channel using a wavelength conversion function, and does not disclose means using an auxiliary pass on a fixed wavelength. Accordingly claim 13 is allowable over the four-way combination of Handelman ('552), Chang, Goyal, and Takada for at least a second reason.

Claim 14 recites an auxiliary optical receiving unit that can change the wavelength. Takada does not teach or suggest this feature. Instead, Takada teaches means for realizing an auxiliary channel using a wavelength conversion function, and does not disclose means using an auxiliary pass on a fixed wavelength. Accordingly claim 14 is allowable over the four-way combination of Handelman ('552), Chang, Goyal, and Takada for at least a second reason.

In view of the above, Applicants respectfully request that this rejection be withdrawn.

The Office Action on page 12, in section 7, rejects claim 15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al, in further view of U.S. Patent No. 5,949,563 to Takada. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Claim 15 depends from claim 1. As discussed above, the combination of Handelman ('522), Chang, Goyal and Takada does not teach or suggest the recited features of claim 1. Accordingly, claim 15 is allowable over the cited four-way combination of Handelman ('522), Chang, Goyal and Takada for at least a first reason that claim 15 is dependent from an allowable claim.

Further, claim 15 recites that upon the occurrence of a defect in a network element in said WDM transmission network, said wavelength component-specific route setting device resets the routes for transmission in said WDM transmission network for all of said wavelength components on routes which have said network element as an element. Takada does not teach or suggest this feature. Instead, Takada teaches an auxiliary switching function, which is not the

recited reset function. See, Takada, col. 2, lines 60-65. Accordingly, claim 15 is allowable over the cited four-way combination of Handelman ('522), Chang, Goyal and Takada for at least a second reason.

In view of the above, Applicants respectfully request that this rejection be withdrawn.

The Office Action on pages 12-14, in section 8, rejects claims 28-32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,404,522 to Handelman in view of U.S. Patent No. 6,545,781 to Chang et al., in further view of U.S. Patent No. 5,949,563 to Takada. Applicant respectfully traverses this rejection because the Office Action fails to establish a *prima facie* case of obviousness.

Initially, Applicants note that claim 29 has been canceled, thus making this rejection moot with respect to claim 29.

Claims 28 and 30-32 depend variously from claim 16. As discussed above, neither Handelman ('522), Chang, nor Takada, alone or in combination, teach or suggest the recited features of claim 16. Accordingly, claims 28 and 30-32 are allowable for at least the reason that they are dependent from an allowable claim.

In view of the above, Applicants respectfully request that this rejection be withdrawn.

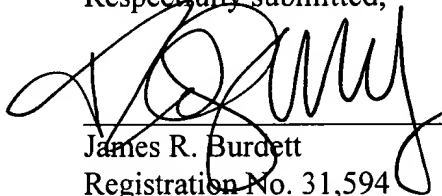
### CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this application is respectfully requested.

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Respectfully submitted,



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